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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/800,998	03/16/2004	Zhiheng Lu	95153-DIV	1581
20736	7590	04/03/2006	EXAMINER	
MANELLI DENISON & SELTER 2000 M STREET NW SUITE 700 WASHINGTON, DC 20036-3307			CHEN, JACK S J	
			ART UNIT	PAPER NUMBER
			2813	

DATE MAILED: 04/03/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/800,998

Applicant(s)

LU ET AL.

Examiner

Jack Chen

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 25 January 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-11 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-11 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on January 25, 2006 has been entered.

Specification

2. The amendment filed January 25, 2006 is objected to under 35 U.S.C. 132(a) because it introduces new matter into the disclosure. 35 U.S.C. 132(a) states that no amendment shall introduce new matter into the disclosure of the invention. The added material which is not supported by the original disclosure is as follows: Re claim 1, the phrase “the **SOI material** having been formed using a SIMOX method by implanting a large dose of oxygen ion into a single crystal silicon wafer and **annealing at a temperature of 1300 °C to below the melting point of the single crystal silicon layer** to form the top single crystal silicon and the buried oxide layer” is not supported by the original disclosure [note: the combination of the annealing steps; i.e., the annealing temperature ranges for forming the SOI material and the annealing temperature ranges for eliminate silicon islands and pinholes]; Re claim 4, the phrase “implanting a large dose of oxygen ion into a single crystal silicon wafer and **annealing at a temperature of 1300 or greater** to form an SOI material comprising a top single crystal silicon

layer” is not supported by the original disclosure [the combination of the annealing steps are not supported by the original disclosure]. Re claims 7-11, the newly added claims 7-11 are not supported by the original disclosure.

Applicant is required to cancel the new matter in the reply to this Office Action.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

4. Claim 1, 4 and 7-11 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. Claims 1, 4, 7-11 are rejected for the reasons shown in above.

The remaining claims 2-3 and 5-6 are rejected for depending from the above rejected claims.

For the purpose of patentability, these claims will be interpreted as best understood.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person

having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

7. Claims 1-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Griffith, U.S./4,786,608 in view of applicant's admitted prior art.

Griffith discloses a method for eliminating silicon islands and pinholes in a buried oxide layer of an SOI material containing a top single crystal silicon layer 14 having a major surface (fig. 1), the buried oxide layer 13 (fig. 1), and a substrate 15 (fig. 1) for eliminating silicon islands and pinholes in the buried oxide layer, the SOI material having been formed using a SIMOX (col. 3, line 60 to col. 4, line 35) method by implanting a large dose of oxygen ion (col. 4, lines 10-13) into a single crystal silicon wafer and using in-situ annealing of the substrate (see abstract section and col. 4, lines 13-30) to form the top single crystal silicon layer 14 and the buried oxide layer 13 (fig. 1), the method comprises implanting ions (i.e., silicon ions, fig. 2) at a dose (Re claim 3, i.e., $1E15$ - $1E16$, see col. 3, line 10) and an energy (Re claim 2: i.e., 120-140 KeV, see col. 4, lines 34-37) into SOI material containing the top single crystal silicon layer 14 and buried oxide layer 13 at a temperature below 100 oC (i.e., room temperature, see col. 4, lines 54-55), to form an amorphous region 22 including said buried oxide layer (note: the amorphous

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region 22 is at least including the top surface of the buried oxide layer) and to keep the original structure in vicinity of the major surface (fig. 2 and col. 4, lines 28-55, also see abstract and summary sections); annealing the SOI material at a temperature in the range from 900 to 1250 oC (i.e., 1150-1250 oC, see col. 4, lines 56-60) to eliminating silicon islands and pinholes in said buried oxide layer, inherently shows eliminating silicon islands and pinholes in the buried oxide layer since the same process is carried out, see figs. 1-4; cols. 1-8 for more detail.

Re claims 2 and 5, wherein the energy is in the range from 30kev to 5Mev (i.e., 120-140 KeV, see col. 4, lines 34-37).

Re claims 3 and 6, wherein the dose for implanting silicon ion is in the range from 1E13 to 5E16 (i.e., 1E15-1E16, see col. 3, line 10).

Re claim 7, wherein the method is conducted to provide the top single crystal silicon layer with a thickness of about 100 to about 200nm (col. 4, lines 20-25).

Re claim 8, wherein the large oxygen dose is from 1.2E18 to 1.8E18 (i.e., 1.6E18, see col. 4, lines 10-13).

Re claim 9, wherein the large oxygen dose has an implantation energy of from 150kev to 200kev (col. 4, lines 13-16).

Re claim 10, wherein during the large oxygen dose, the silicon wafer is heated from 450 to 700 oC (i.e., 500 oC, col. 4, lines 25-30).

Griffith disclosed above, however, Griffith is silent to using the annealing temperature of 1300 °C to below the melting point of the silicon (1300 °C or greater) to form the SOI.

Applicant's admitted prior art teaches a method for forming semiconductor device, which comprises implanting large does of oxygen ion into a single crystal silicon wafer and

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subsequently annealing at high temperature above 1300 °C to form the SOI having the buried oxide in the silicon wafer (page 1, last paragraph to page 2, first paragraph).

Therefore, the subject matter as a whole would have been obvious to one having ordinary skill in the art at the time the invention was made to use the annealing temperature range as taught by Applicant's admitted prior art in the method of Griffith in order to heal damage in the thin silicon layer.

Furthermore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the method of Griffith by selecting the suitable temperature, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. In re Aller, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jack Chen whose telephone number is (571)272-1689. The examiner can normally be reached on Monday-Friday (9:00am-6:30pm) alternate Monday off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carl W. Whitehead can be reached on (571)272-1702. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Jack Chen
Primary Examiner
Art Unit 2813

March 30, 2006